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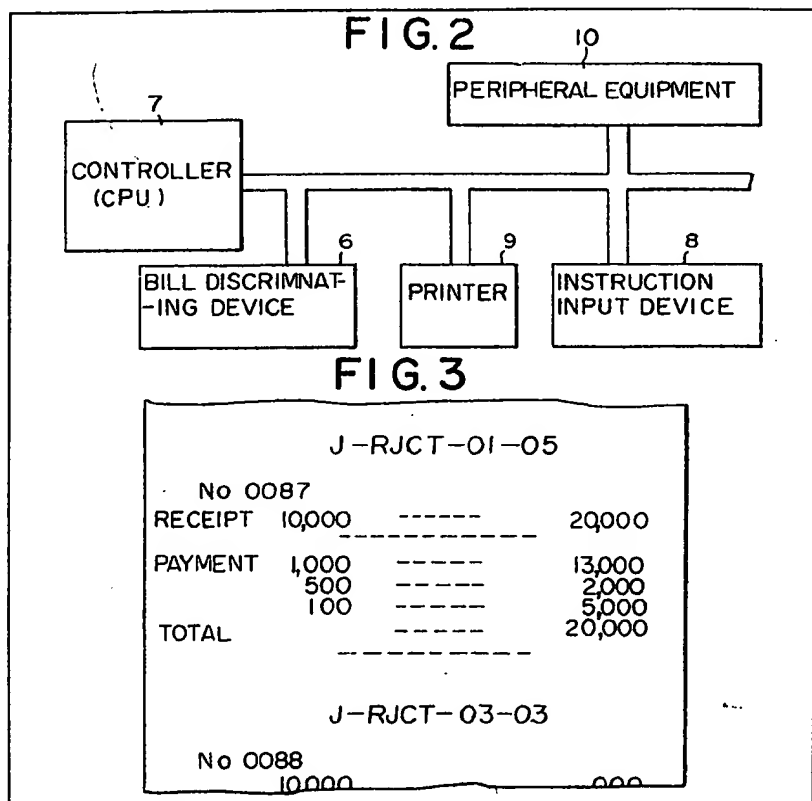
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(54) Bank note receiving apparatus

(57) A bank note receiving apparatus for use in a change machine or an automatic deposit machine includes a bank note discriminating device (6) for checking whether or not a bank note is correct. The discriminating device signals which indicate why a bank note is incorrect are stored in a memory of a controller (7). In

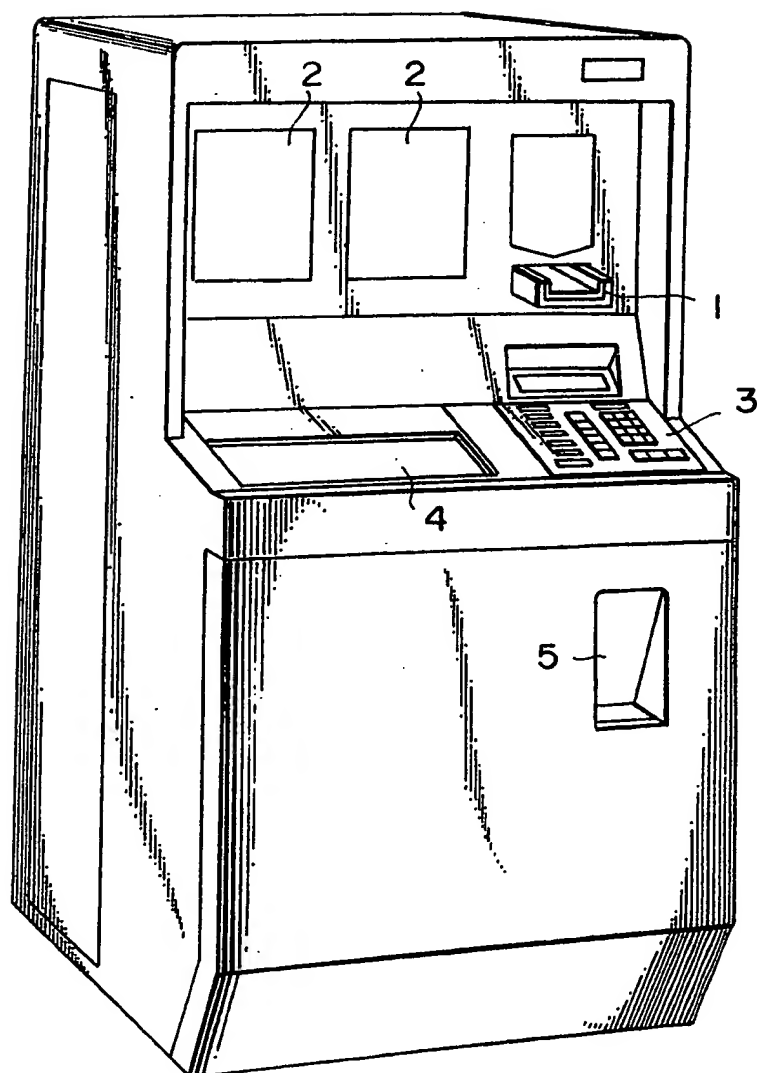
accordance with an instruction from an instruction input device (8), the signals are delivered from the memory of the controller to a printing device (9) which prints out the reasons why a bank note is incorrect, e.g. at the time the banknote is rejected or during a maintenance operation carried out on the machine. The printer may print out the number of times the same type of discrimination signal has caused rejection of banknotes.



GB 2 088 832 A

1/2

FIG. 1



2/2

FIG. 2

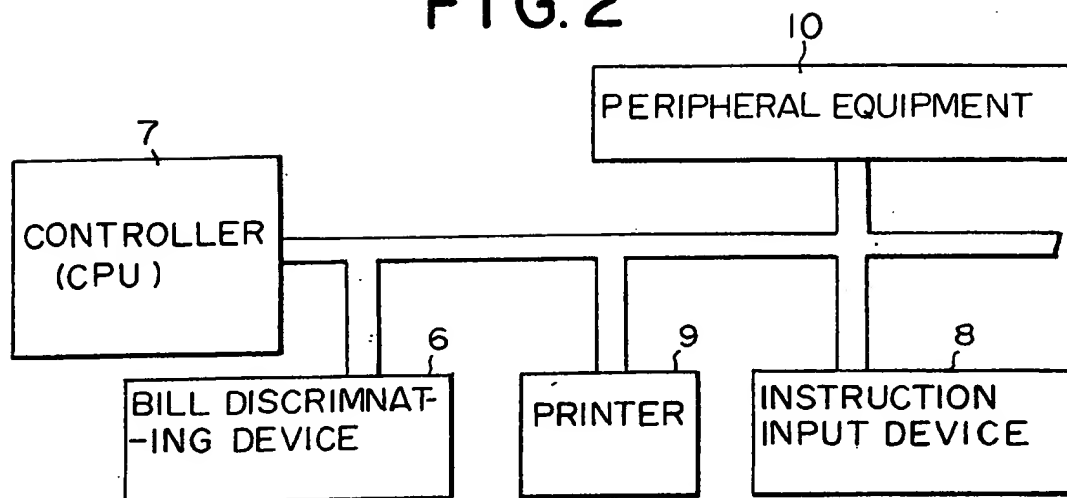


FIG. 3

J-RJCT-01-05			
No 0087			
RECEIPT	10,000	-----	20,000
PAYMENT	1,000	-----	13,000
	500	-----	2,000
	100	-----	5,000
TOTAL		-----	20,000
J-RJCT-03-03			
No 0088			
	10,000		000

SPECIFICATION

Bank note receiving apparatus

This invention relates to bank note receiving apparatus for use in a change machine, automatic deposit machine or the like.

Bank note receiving apparatus must accept only correct bank notes and reject incorrect bank notes. To do this, the apparatus is provided with a bank note discriminating device which checks the type of bank note and the correctness of the bank note in various ways. For instance, a conventional bank note receiving apparatus has a discriminating device which can check the photo pattern of a bank note using a photosensor, check if two bank notes have been supplied simultaneously, check the length of the bank notes, and check if the bank notes are being supplied continuously. It is also possible to check a magnetic pattern of a bank note with a magnetic sensor. These checks are performed by a discriminating device, the performance of which is determined by an electric adjustment (level adjustment) of an electric circuit of the device.

Conventional change machines, deposit machines and so forth, however, have the following disadvantage. Namely, even if these machines are delivered and situated after being optimally adjusted, the performance of the discriminating device changes gradually due to changes with time of the elements used in the device, collection of dust, temperature changes, or wear of the belt which transfers the bank notes.

In the conventional apparatus, correct bank notes which are judged as being unacceptable as a result of changes in the performance of the discriminating device have been rejected as well as incorrect bank notes. Therefore, when the administrator of the change machine or the deposit machine becomes aware of an increase in the rejection rate, it is necessary to investigate the reasons for the increase. To do this, a maintenance person must actually insert a number of bank notes into the machine to find out what kind of bank notes are being rejected by which checking function, and then, for example, readjust the levels, which is troublesome work. Thus, the maintenance person must spend a considerable amount of time investigating the reasons for the increase in the rejection rate. Another problem is that the bank notes inserted by the maintenance person are not always rejected for the same reasons as those rejected during ordinary use of the machine. Furthermore, the bank notes carried by the maintenance person are often in a better condition than the bank notes carried by the ordinary users of the machines, so that the rate of rejection during inspection is usually much lower than that during ordinary use, making it difficult to ascertain exactly the reasons for rejection.

According to the invention, there is provided bank note receiving apparatus, comprising: bank note discriminating means for checking whether or not a bank note is correct; controlling means for receiving signals from the bank note

discriminating means indicating the reasons why a bank note is incorrect and having a memory for recording the signals; instruction input means for giving an instruction concerning the reasons why a bank note is incorrect to the controlling means; and printing means for printing out the reasons why a bank note is incorrect upon receipt of an instruction from the controlling means.

In order that the invention may be more readily understood, an embodiment thereof will now be described, by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a change machine incorporating bank note receiving apparatus embodying the invention;

FIGURE 2 is a block diagram of a control circuit for handling the bank notes; and

FIGURE 3 illustrates a printout from the bank note receiving apparatus showing the reasons for rejections.

Referring now to the drawings, Figure 1 shows a change machine incorporating bank note receiving apparatus embodying the invention.

Bank notes are inserted into the machine through a bank note receiving opening 1. Instruction panels 2 with money exchange instructions and other remarks for the user are provided, together with an operating panel 3 for inputting and displaying the amount of money to be exchanged and so forth. Pay-off openings 4 and 5 are also provided, through which the changed bank notes and coins are discharged. In operation, as in the case of a conventional machine, a bank note inserted into the bank note receiving opening 1 is checked by a bank note discriminating device 6 (Figure 2) to ensure that the bank note is correct and is of the correct type and any incorrect bank note is rejected and returned through the bank note receiving opening 1.

Figure 2 shows a control circuit for treating a rejected bank note. The discriminating device 6 delivers to a controller 7 various codes representing the kinds of check functions performed such as an abnormal running (01), abnormal bank note length (02), double feed of bank notes (03), abnormal photopattern (04), abnormal magnetic pattern (05), continuous feed of bank notes (06) and so forth, together with a signal representing the type of bank note such as a 10,000 yen bank note (01), a 5,000 yen bank note (02), a 1,000 yen bank note (03), a 500 yen bank note (04) and so forth, if the type of bank note is discriminated. The controller 7 is a device such as a central processing unit capable of performing the ordinary exchanging functions and having a memory for memorizing various data. The controller 7 can, according to an instruction previously given by an instruction input device 8, either print the reason for rejection of a bank note automatically at the time of the rejection (automatic printing mode), or print the reasons for rejection optionally at any time when requested (optional printing mode), for example, during maintenance of the machine. If the selected mode

is, for example, the automatic printing mode, a printer 9 is actuated at the time of each rejection to produce a printout similar to that shown in Figure 3. Reference numeral 10 generally designates peripheral equipment which includes, for example, bank note and coin pay-off devices in the case of the money changing machine.

In the case where the reason for rejection is to be printed at the time of each rejection (automatic printing mode), the instruction input device 8 is switched to the automatic printing mode, while, when it is desired to print out the types of rejected bank notes and the reasons for rejection which have occurred up to a time the machine is examined for maintenance, the instruction input device 8 is switched to the optional printing mode. In the latter case, printing is started by pressing a print button provided in the instruction input device 8, at any time as required for examination of the machine. The printer 9 is disposed at a place different from the operation section 3, such as at the rear panel of the machine which is not visible to the ordinary user of the machine.

Figure 3 shows an example of the printout of data obtained in the automatic printing mode. The data reads "J-RJCT-01-05". The code "J-RJCT" is a code representing rejection of the bank note by the bank note discrimination device 6. The code "01" indicates that the rejection bank note is for example a 10,000 yen bill and the code "05" indicates that the reason for rejection is an abnormality in the magnetic pattern of the bank note. The method of the printing can be determined as desired.

The automatic printing mode offers the advantage that the reasons for rejection can be seen with respect to time, that is, the number of money changing operations. For this reason, it is preferable to record the time of rejection together with the reason for rejection.

Other portions of the printed data are data peculiar to the change machine, such as the types and sums of bank notes received, and kinds and sums of the bank notes and coins paid out.

By providing a memory for recording the number of rejections for each checking function, i.e. for each reason for rejection, and for each type of bank note including unidentified bank notes, it is possible to print the contents of these memories according to an instruction from the instruction input device 8, which can be effected as desired by pressing the printing button when in the optional printing mode. In such a case, the number of rejection cycles is added to the end of the above mentioned data. Namely, the printed code is, for example, "J-RJCT-01-01-(number)", "J-RJCT-01-02-(number)" or the like. Such printed data allows the frequency of rejection of each type of bank note for each reason for rejection to be quickly ascertained, while eliminating the trouble of providing a printout for each rejection and wasting

recording paper.

As described, bank note receiving apparatus embodying the invention records the reason for rejection of a bank note and either prints out the details at the time of each rejection or, alternatively, stores the number of rejections recorded for each type of bank note and each reason so that they may be printed out at any desired time by a printing instruction.

Therefore it is possible easily and promptly to recognize the reasons for rejection by simply reading the data printed on the recording paper, and to take the necessary measures such as a readjusting the sensitivity levels of the discriminating device in the light of the recorded data. Consequently, the maintenance time is considerably shortened and the rate of operation of the bank note receiving apparatus is advantageously very much increased.

CLAIMS

1. Bank note receiving apparatus, comprising: bank note discriminating means for checking whether or not a bank note is correct; controlling means for receiving signals from the bank note discriminating means indicating the reasons why a bank note is incorrect and having a memory for recording the signals; instruction input means for giving an instruction concerning the reasons why a bank note is incorrect to the controlling means; and printing means for printing out the reasons why a bank note is incorrect upon receipt of an instruction from the controlling means.

2. Bank note receiving apparatus according to claim 1, wherein the bank note discriminating means is capable of checking for abnormal running, abnormal bank note length, double feeding of bank notes, abnormal photopatterns, abnormal magnetic patterns, and continuous feeding bank notes.

3. Bank note receiving apparatus according to claim 1 or 2, wherein the printing means also prints out the type of a bank note which is incorrect.

4. Bank note receiving apparatus according to claim 1, 2 or 3, wherein the printing means is arranged to printout the number of times the same reason for rejection of each type of bank note has occurred.

5. Bank note receiving apparatus according to claim 1, 2, 3 or 4, wherein the printing means has an automatic printing mode in which a printout is produced each time a bank note is determined to be incorrect and an optional printing mode in which a printout is produced only when requested.

6. Bank note receiving apparatus substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

7. Any novel feature or combination of features described herein.